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Forest Service
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State and Private
Forestry

Forest Insect and Disease Conditions .. 1977

in the Northern Region

Report No. 1
July 1978

Cover Photo - Millions of lodgepole pine trees on the west side of Glacier National Park, Montana, are being killed by the mountain pine beetle. This photograph shows a heavy concentration of dead trees in Quartz Creek drainage during 1977.

FOREST INSECT AND DISEASE CONDITIONS
1977
IN THE NORTHERN REGION

by

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INSECT AND DISEASE CONDITIONS IN BRIEF

Insects

The western spruce budworm continues to be a major pest in the Region; 3.7 million acres of defoliated stands on National Forest, other Federal, State, and private lands were visible from the air.

Larch casebearer populations increased this year and defoliated more than a half million acres of western larch.

Nearly 27 M acres of western larch also were defoliated by a larch sawfly.

No Douglas-fir tussock moth-caused defoliation was detected.

Moderate defoliation of ponderosa pine by the pine butterfly occurred on 1.1 M acres.

The forest tent caterpillar heavily defoliated quaking aspen on 195 M acres in the Turtle Mountains, North Dakota.

A pine needle miner heavily defoliated nearly 10 M acres of ponderosa pine on the Flathead Indian Reservation and the Lolo National Forest, Montana. This was the first occurrence of this miner in the Region.

Spring and fall cankerworms annually defoliate Siberian elm in North Dakota shelterbelts. Many trees have died from this continuous defoliation.

The mountain pine cone beetle destroyed about 85 percent of the second-year western white pine cones in a Sandpoint, Idaho, seed orchard.

The mountain pine beetle is the major tree killer in the Region. It killed almost 22.9 MM lodgepole pine on more than 568 M acres, and almost 463.3 M ponderosa pine on 73.3 M acres in Montana. Several thousand limber pine were killed by the beetle in the Elkhorn Mountains in central Montana. The beetle is a chronic problem to mature western white pine on the Flathead National Forest, Montana, and in northern Idaho. The pine engraver beetle killed trees in the Region as early as mid-June. The dry spring and summer favored this earlier than usual buildup of beetle populations.

Mortality caused by the Douglas-fir beetle increased in northern Idaho. Also few hundred beetle-killed trees were found on the Helena National Forest, Montana.

Western balsam bark beetles killed more than 10 M subalpine fir in scattered areas of the Rocky Mountains from northern Montana south to Yellowstone National Park, Wyoming.

Diseases

Several new areas of lodgepole pine with heavy comandra blister rust infection were found. An unidentified canker-causing fungus caused top dieback of Douglas-fir and true firs.

Root fungi did not cause much damage to bareroot nursery seedlings, but Fusarium spp. caused 5 to 10 percent losses in container-grown seedlings.

Nearly 2,000 high-risk hazard trees with butt and root rot were removed from recreation sites in Yellowstone National Park.

Dutch elm disease was found in Ravalli County, Montana, for the first time. The smaller European elm bark beetle was collected in several eastern Montana communities.

A survey of lodgepole pine stands near West Yellowstone, Montana, showed that large areas were dwarf mistletoe-free. Two crossover infections of lodgepole pine dwarf mistletoe on whitebark pine were found near West Yellowstone, Montana.

Laminated root rot is causing an annual growth impact of 400 to 500 MMBF in northern Idaho. Shoestring root rot is causing disease centers as large as 300 acres in central Montana. Annosus root rot is a potential problem associated with bark beetle-killed ponderosa pine. Windthrown Douglas-fir seed trees with annosus-decayed roots were also found.

Needle diseases were more prevalent this year than in recent preceding years. Heavy infections of leaf rust caused early leaf fall in quaking aspen stands.

Fluorides emitted from an aluminum smelter have damaged several conifer species on 20 M to 30 M acres. Sulphur oxides, mercaptans, and hydrogen sulfides emitted from a pulp mill caused injury to Douglas-fir and ponderosa pine. Sulphur dioxide and heavy metals emitted from a copper smelter have damaged more than 300 M acres of nearby ecosystems. Sulphur oxides and fluorides emitted from coal-fired electric power generating plants in eastern Montana caused damage to ponderosa pine.

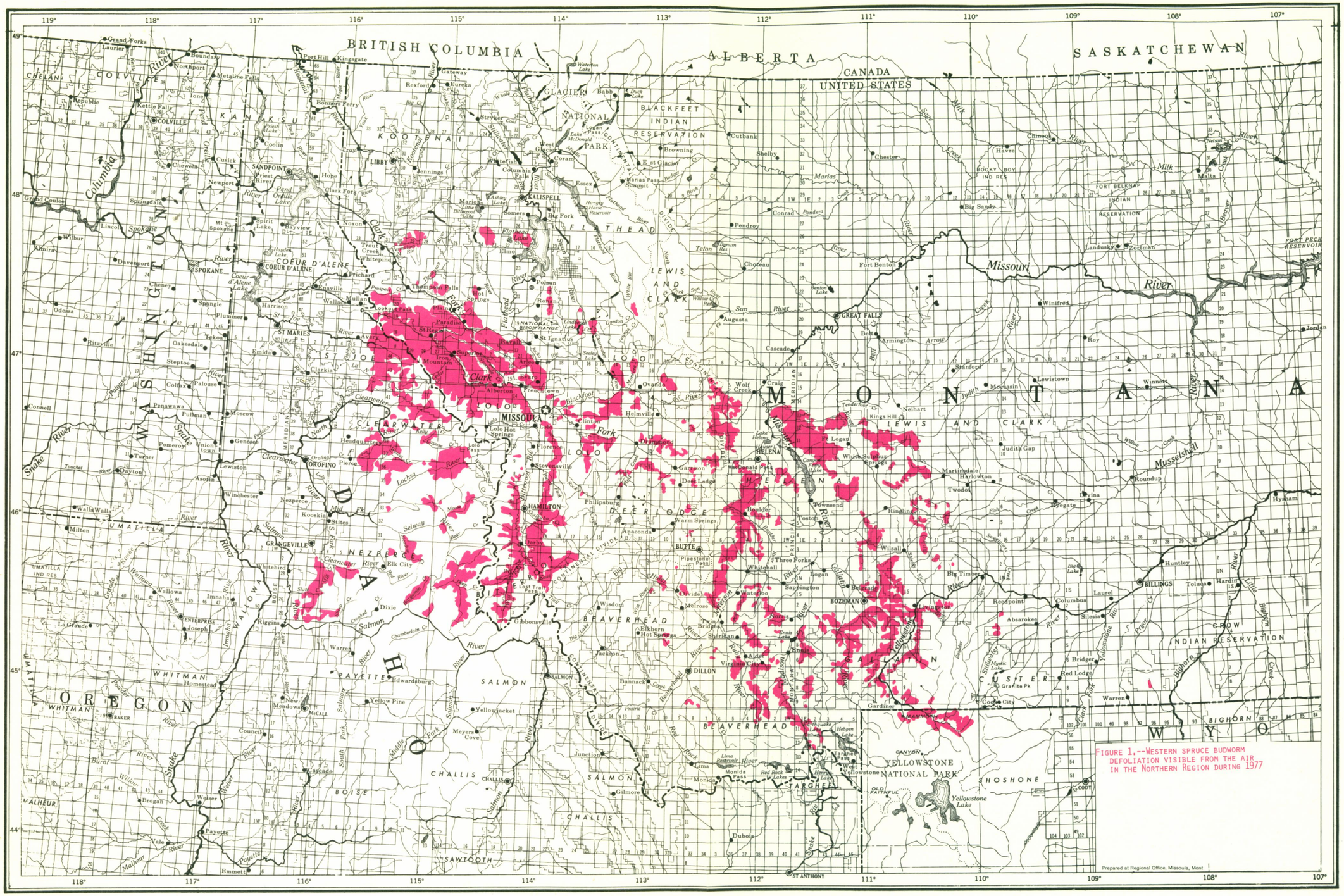
Despite dry conditions this year, no drought-related damage to trees was found.

STATUS OF INSECTS
Major Defoliators

Western Spruce Budworm, Choristoneura occidentalis (Freeman)

The size of the western spruce budworm epidemic constantly fluctuates from area to area and year to year in the Northern Region. Total acres of defoliation visible from the air increased from 3.2 MM acres in 1976 to 3.7 MM acres in 1977 (figure 1). Increases occurred on eight of the 13 National Forests and on the Flathead Indian Reservation. Decreases were evident on the remaining five National Forests and in Yellowstone National Park (table 1). No budworm suppression was attempted during 1977.

Budworm egg mass surveys in selected units indicate that defoliation will continue at about the same intensity over most of the Region during 1978.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CANADA
UNITED STATES
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IDAHO
OREGON
WASHINGTON
WYOMING
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Snake River
Missouri River
Clearwater
Salmon
Clark Fork
Flathead
Kootenai
Spokane
Milk
Marias
Musselshell
Yellowstone
Bighorn
Powder
Grand Coulee
Dworshak Reservoir
Hungry Horse Reservoir
Fort Peck Reservoir
Yellowstone Lake
Red Rock Lakes
Flathead Lake
Pend Oreille Lake
Coeur d'Alene Lake
Priest Lake
Lake Pend Oreille
Kerr Reservoir
Libby Reservoir
Bonners Ferry
Grand Forks
Laurier
Boundary
Northport
Metaline Falls
Republic
Kettle Falls
Colville
Chewelah
Cusick
Newport
Usk
Priest River
Sandpoint
Hope
Clark Fork
Libby
Troy
Eureka
Rexford
Gateway
Port Hill
Kingsgate
Waterton Lake
Babb
Duck Lake
Cut Bank
Shelby
Chester
Havre
Chinook
Nelson
Malta
Rocky Boy Ind Res
Fort Belknap Indian Reservation
Big Sandy
Conrad
Pondera
Pendroy
Choteau
Fort Benton
Landusky
Zortman
Winifred
Roy
Jordan
Lewistown
Winnett
Mosquito
Stanford
Geyser
Great Falls
Belt
Armington
Cascade
Craig
Wolf Creek
Augusta
Sun River
Teton River
Benton Lake
Willow Creek Reservoir
Blackfeet Indian Reservation
Glacier National Park
Two Medicine Lake
Lake McDonald
Lake St Mary
Many Glacier
Waterton Lake
Browning
East Glacier
West Glacier
Coram
Essex
Marias Pass Summit
Columbia Falls
Whitefish
Kalispell
Somers
Big Fork
Flathead Lake
Polson
Ronan
Hot Springs
Thompson Falls
Plains
Paradise
St Regis
Superior
Iron Mountain
Arlee
Ravalli
St Ignatius
National Bison Range
Lake Mary Ronan
Lindbergh Lake
Seeley Lake
Salmon Lake
Swan Lake
Swan River
Bigfork
Marion
Little Bitterroot Lake
Whitefish Lake
Noxon
Trout Creek
Whitepine
Prichard
Coeur d'Alene
Spokane
Cheney
Spangle
Plummer
Harrison
St Maries
Avery
Clarkia
Emida
Oakesdale
Tekoa
Ritzville
Odessa
Davenport
Wilbur
Almira
Lincoln
Springdale
Mt Spokane
Spirit Lake
Bayview
Hayden Lake
Steptoe
Colfax
Palouse
Pullman
Moscow
Genesee
Pomeroy
Union Town
Dayton
Turner
Asotin
Lewiston
Winchester
Nezperce
Kooskia
Stites
Orofino
Pierce
Headquarters
Lolo Hot Springs
Lolo Pass
Missoula
Clinton
Frenchtown
Alberton
Ovando
Helmville
Florence
Stevensville
Hamilton
Darby
Lochsa
Selway
Powell
Elk City
Dixie
Grangeville
Whitebird
Riggins
Salmon
Challis
Mackay
Arco
Idaho Falls
Blackfoot
Pocatello
Malad City
Preston
Soda Springs
Montpelier
Bear Lake
Logan
Brigham City
Ogden
Salt Lake City
Provo
Price
Vernal
Rock Springs
Green River
Evanston
Kemmerer
Afton
Jackson
Yellowstone National Park
Old Faithful
Canyon
Mammoth
Gardiner
Cooke City
Red Lodge
Granite Pk
Bridger
Absarokee
Roscoe
Columbus
Reedpoint
Laurel
Billings
Huntley
Big Timber
Livingston
Bozeman
Three Forks
Whitehall
Butte
Pipestone Pass
Anaconda
Warm Springs
Deer Lodge
Philipsburg
Boulder
Townsend
Toston
Helena
Wilsall
Ringling
Martinsdale
Harlowton
Twodot
Judith Gap
White Sulphur Springs
Fort Logan
Kings Hill
Neihart
Lewis and Clark
Meagher
Gallatin
Madison
Beaverhead
Dillon
Virginia City
Ennis
Sheridan
Twin Bridges
Melrose
Wisdom
Elkhorn Hot Springs
Gibbonsville
Salmon
Lemhi
Leadore
Tendoy
Bannack
Jackson
Dubois
Sawtooth
Custer
Crow Indian Reservation
Big Horn
Hysham
Forsyth
Miles City
Ekalaka
Broadus
Baker
Weiser
Cambridge
Council
McCall
New Meadows
Yellow Pine
Yellowjacket
Meyers Cove
Edwardsburg
Payette
Homestead
Ontario
Vale
Nyssa
Brogan
Huntington
Baker
La Grande
Enterprise
Joseph
Imnaha
Wallowa
Grande Ronde
Walla Walla
Milton
Pendleton
Umatilla
Umatilla Ind Res
Milton-Freewater
Hermiston
Boardman
Arlington
Condon
Fossil
Prineville
Redmond
Bend
Madras
Warm Springs Ind Res
The Dalles
Hood River
Portland
Vancouver
Longview
Kelso
Centralia
Chehalis
Olympia
Tacoma
Seattle
Everett
Bellingham
Mount Vernon
Anacortes
Port Angeles
Aberdeen
Hoquiam
Raymond
South Bend
Astoria
Seaside
Tillamook
Lincoln City
Newport
Florence
Coos Bay
North Bend
Reedsport
Gold Beach
Brookings
Crescent City
Eureka
Arcata
Fortuna
Ferndale
Redway
Garberville
Willits
Ukiah
Clear Lake
Lakeport
Santa Rosa
Petaluma
San Rafael
San Francisco
Oakland
Berkeley
San Leandro
Hayward
Fremont
San Jose
Santa Cruz
Monterey
Salinas
Hollister
Gilroy
Morgan Hill
Los Gatos
Palo Alto
Redwood City
San Mateo
Daly City
Half Moon Bay
Pacifica
Sausalito
Mill Valley
San Anselmo
Fairfax
Novato
Petaluma
Sonoma
Napa
Vallejo
Benicia
Martinez
Pittsburg
Antioch
Brentwood
Oakley
Concord
Walnut Creek
Danville
San Ramon
Livermore
Pleasanton
Dublin
Castro Valley
San Lorenzo
Alameda
Oakland
Berkeley
Richmond
El Cerrito
San Pablo
Albany
Emeryville
Piedmont
Orinda
Moraga
Lafayette

Table 1--Acres of aerially visible [1/] western spruce budworm defoliation in the Northern Region from 1976 to 1977

Unit [2/]	Acres of visible defoliation 1976	Acres of visible defoliation 1977	Increase or decrease in size of infestation (acres)
Northern Idaho			
Clearwater National Forest Area	358,070	286,407	- 71,663
Idaho Panhandle National Forests Area	190,591	176,454	- 14,137
Nezperce National Forest Area	107,050	184,315	+ 77,265
Subtotal	655,711	647,176	- 8,535
Montana			
Beaverhead National Forest Area	250,427	173,250	- 77,177
Bitterroot National Forest Area [3/]	413,641	451,495	+ 37,854
Custer National Forest Area	5,155	7,370	+ 2,215
Deerlodge National Forest Area	223,666	183,207	- 40,459
Flathead Indian Reservation	68,156	129,438	+ 61,282
Flathead National Forest Area	99,801	54,527	- 45,274
Gallatin National Forest Area	286,325	427,990	+141,665
Helena National Forest Area	313,161	462,979	+149,818
Kootenai National Forest Area	9,685	20,029	+ 10,344
Lewis & Clark National Forest Area	5,927	116,499	+110,572
Lolo National Forest Area	820,330	947,941	+127,611
Subtotal	2,496,274	2,974,725	+478,451
Wyoming			
Yellowstone National Park	114,572	79,330	- 35,242
Grand Total	3,266,557	3,701,231	+434,674

1/ Aerially visible defoliation occurs when 25 percent or more of the current foliage is consumed.

2/ Infested acreage on National Forest maps includes all Federal, State, and private lands.

3/ A portion of the Bitterroot National Forest is in northern Idaho.

Larch Casebearer, Coleophora laricella (Hbn.)

An aerial survey to detect visible casebearer defoliation was made for the first time since 1968 over the entire larch type in the Northern Region. About 503.5 M acres showed defoliation, mainly in northern Idaho (table 2, figure 2).

Larch casebearer parasitism by native and introduced parasites was evaluated in northern Idaho and western Montana. Sampling was done at 104 sites where releases of Agathis pumila (Ratz.) had been made between 1967 and 1969, and from 25 additional locations near the release sites. Total parasitism averaged 23.2 percent on all sites. Agathis pumila (Ratz.) was collected at 62 release plots and 7 random plots, and parasitism averaged 12.6 percent. The other nonnative parasite, Chrysocharis laricinellae (Ratz.) was found on 59 of the original A. pumila release plots and 19 random plots, and parasitism averaged 8.3 percent. Parasitism by native parasites ranged from an average of 0.08 to 2.61 percent on the 129 plots. Only five of these native parasites were of any consequence. Mesopolobus sp. was the most abundant.

Table 2--Acres of aerially visible larch casebearer defoliation in the Northern Region during June 1977

Area	State and private lands (acres)	Federal lands (acres)	Total acres
Montana			
Flathead National Forest Area	23,196	56,590	79,786
Flathead Indian Reservation		27,600	27,600
Idaho Panhandle National Forests			
Kaniksu National Forest Area	129,750	74,800	204,550
Coeur d'Alene National Forest Area	84,760	75,135	159,895
St. Joe National Forest Area	31,410	300	31,710
Total	269,116	234,425	503,541

Forest Tent Caterpillar, Malacosoma disstria (Hbn.)

The forest tent caterpillar heavily defoliated 195 M acres of aspen throughout the Turtle Mountains in North Dakota in 1977. Observations in June showed parasites were abundant and some larvae were diseased. An evaluation in late summer indicated these natural control factors were significantly reducing the infestation and may cause it to collapse.

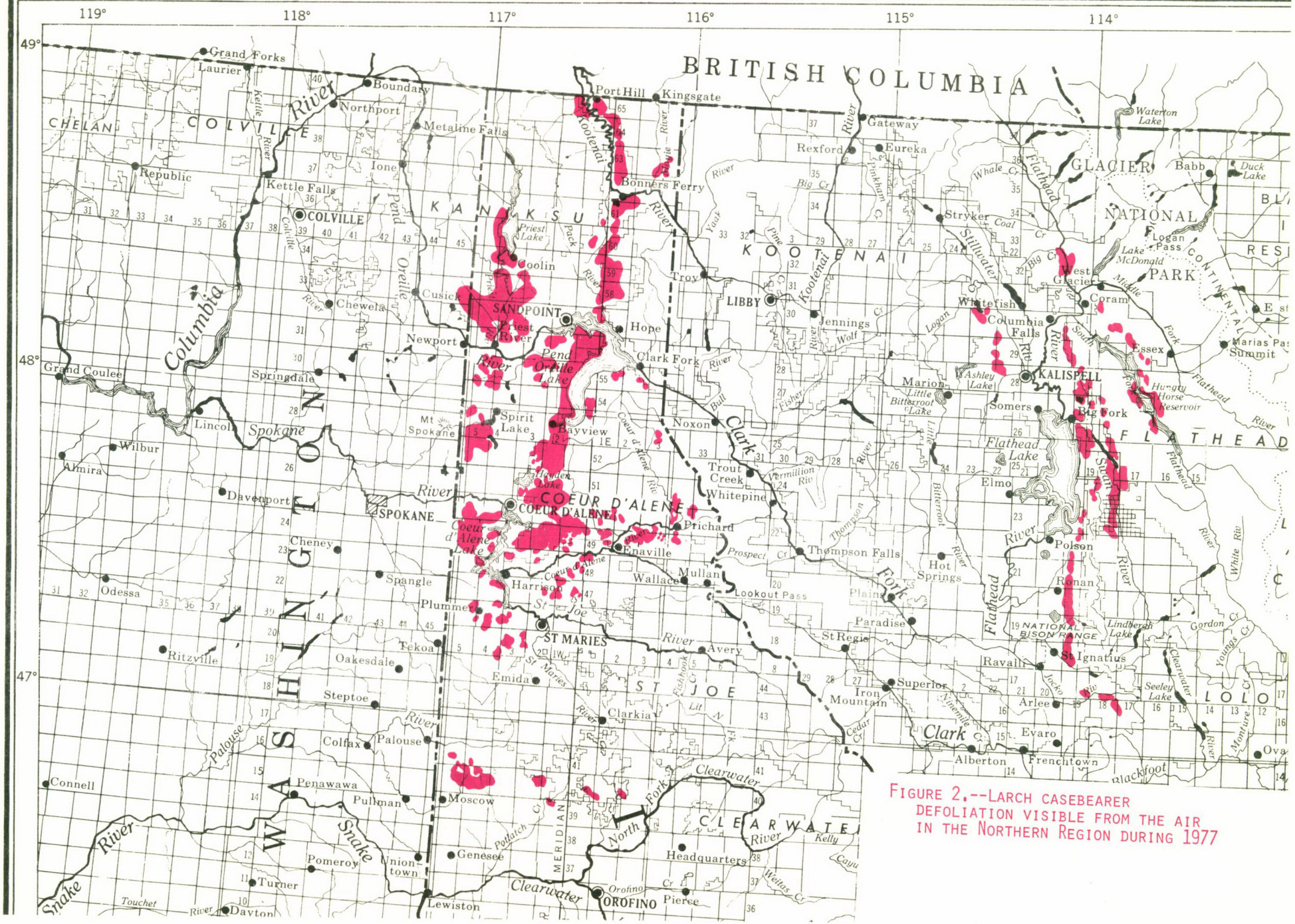


FIGURE 2.--LARCH CASEBEARER DEFOLIATION VISIBLE FROM THE AIR IN THE NORTHERN REGION DURING 1977

Northern Tent Caterpillar, Malacosoma californicum pluviale (Dyar.)

This is probably a subspecies of the western or Great Basin tent caterpillar. The first large outbreak of this insect occurred in the Northern Region during 1977. Deciduous trees and shrubs, especially willows, were heavily defoliated along the Pack River drainage and the adjacent Sundance fire area in northern Idaho. Defoliation may be beneficial by releasing planted conifers in the burned area. Abundant egg masses in late summer indicate the infestation will probably continue in 1978.

Pine Butterfly, Neophasia menapia (Felder and Felder)

Pine butterfly outbreaks seldom occur in the Northern Region, but the potential is always there. Adults are often conspicuous in late summer flying around the crown of pines throughout the western part of the Region. The last major epidemic died out in 1973. Small outbreaks have persisted on the Flathead Indian Reservation and National Bison Range, Montana. Moderate defoliation was evident on about 1.5 M acres of ponderosa pine in 1976 and on about 1.9 M acres in 1977.

An evaluation of overwintering egg numbers in January indicated defoliation will probably be light on the Flathead Indian Reservation and heavy on the Bison Range in 1978.

Douglas-Fir Tussock Moth, Orgyia pseudotsugata (McD.)

No tussock moth infestations were found in the Northern Region in 1977. Larval densities were undetectable on permanent plots in northern Idaho and Montana though male moths were caught in pheromone traps.

A Pine Needle Miner, Coleotechnites sp.

Larvae of this moth severely defoliated 9,904 acres of ponderosa pine on the Flathead Indian Reservation and the Lolo National Forest. A grove of ponderosa pine trees on the University of Montana campus was also defoliated. This is the first report of this insect in the Northern Region. Many overwintering larvae were found in needles in the infested areas, so some defoliation is expected during 1978.

Spring and Fall Cankerworms, Paleacrita vernata (Peck) and Alsophila pometaria (Harris)

Feeding together, these two cankerworms severely defoliate Siberian elm shelterbelts annually in North Dakota. Ground surveys in 1977 showed that many of these belts have died from continuous defoliation. Cankerworms also defoliated several areas of American elms along river banks in eastern North Dakota.

A microbial insecticide, Bacillus thuringiensis Berliner, will be demonstrated as an aerial spray to control cankerworms on several shelterbelts in 1978.

Sawfly In Western Larch, Anoplonyx sp.

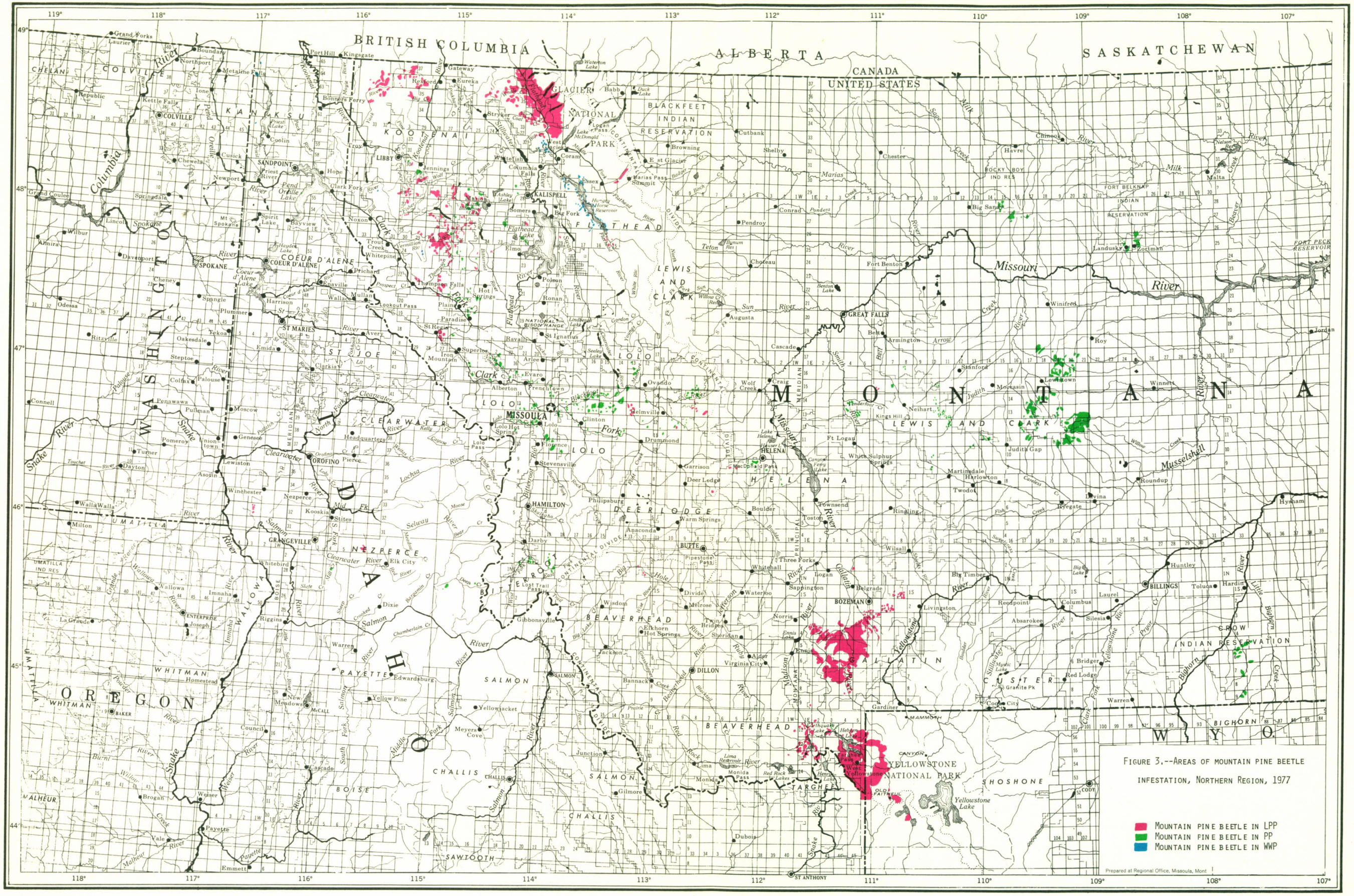
Extensive defoliation of larch stands by sawflies has not been observed in R-1 since 1965 when larch sawfly populations were abundant. In 1977, a species of Anoplonyx heavily defoliated about 17 M acres of larch on the Kootenai National Forest and about 6 M acres in Glacier National Park. Small areas of sawfly defoliation were detected on the Flathead National Forest.

Outbreaks of Anoplonyx are short-lived in this Region, seldom lasting more than 1 year.

Major Bark Beetles

Mountain Pine Beetle, Dendroctonus ponderosa Hopk.

This beetle is the major tree killer in the Northern Region. Huge epidemics have developed in lodgepole and ponderosa pine stands in Montana and chronic tree killing persists in overmature western white pine stands in the Region (figure 3). Amount of damage in each infested area is summarized in table 3.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Snake River
Clearwater River
Salmon River
Kootenai River
Flathead Lake
Pend Oreille Lake
Coeur d'Alene Lake
Priest Lake
Lake McDonald
Waterton Lake
Duck Lake
Babb
Cutbank
Browning
Shelby
Chester
Havre
Chinook
Malta
Fort Belknap Indian Reservation
Rocky Boy Ind Res
Fort Peck Reservoir
Big Sandy
Conrad
Pendroy
Choteau
Fort Benton
Landusky
Zortman
Winifred
Roy
Jordan
Stanford
Lewistown
Winnett
Judith Gap
Musselshell
Roundup
Twodot
Martinsdale
Harlowton
Ryegate
Hysham
Huntley
Billings
Toluca
Hardin
Laurel
Big Timber
Reedpoint
Columbus
Absarokee
Silesia
Crow Indian Reservation
Bridger
Red Lodge
Warren
Cooke City
Granite Pk
Gardiner
Mammoth
Yellowstone National Park
Canyon
Old Faithful
Yellowstone Lake
Shoshone
Cody
Wolf Creek
Craig
Neihart
Kings Hill
Ft Logan
White Sulphur Springs
Townsend
Toston
Rimini
Wilsall
Three Forks
Whitehall
Logan
Sappington
Belgrade
Bozeman
Livingston
Norris
Ennis
Ennis Lake
Virginia City
Ajax
Sheridan
Twin Bridges
Ruby Reservoir
Jackson
Wisdom
Elkhorn Hot Springs
Melrose
Divide
Waterloo
Dillon
Bannack
Gibbonsville
Salmon
Lemhi
Leadore
Tendoy
Baker
Sumpter
Granite
Bourne
Whitebird
Grangeville
Nezperce
Kooskia
Stites
Elk City
Orofino
Pierce
Lewiston
Asotin
Clarkston
Winchester
Wallowa
Enterprise
Joseph
La Grande
Imnaha
Riggins
Dixie
Warren
Edwardsburg
Yellow Pine
Yellowjacket
Meyers Cove
New Meadows
McCall
Council
Cascade
Weiser
Brogan
Payette
Emmett
Ontario
Vale
Malheur
Burns
Milton
Walla Walla
Umatilla
Umatilla Ind Res
Pomeroy
Dayton
Touchet
Colfax
Pullman
Moscow
Genesee
Palouse
Steptoe
Oakesdale
Tekoa
Rosalia
Connell
Ritzville
Odessa
Davenport
Wilbur
Creston
Harrington
Sprague
Cheney
Spokane
Mt Spokane
Spirit Lake
Bayview
Newport
Usk
Cusick
Chewelah
Republic
Kettle Falls
Colville
Ione
Metaline Falls
Boundary
Northport
Laurier
Grand Forks
Grand Coulee
Springdale
Wilbur
Lincoln
Davenport
Cheney
Spangle
Plummer
Rathdrum
Coeur d'Alene
Harrison
Wallace
Mullan
Osburn
Pinehurst
Kellogg
Wardner
Smelterville
Silverton
Wallace
Lookout Pass
Mullan
Prichard
Murray
Thompson Falls
Noxon
Trout Creek
Whitepine
Libby
Troy
Bonners Ferry
Moyie River
Porthill
Kingsgate
Gateway
Eureka
Rexford
Stryker
Whitefish
Columbia Falls
Hungry Horse Reservoir
Hungry Horse
Coram
West Glacier
Glacier National Park
Lake McDonald
Logan Pass
Continental Divide
East Glacier
Marias Pass
Summit
Blackfeet Indian Reservation
Ashley Lake
Kalispell
Somers
Big Fork
Flathead Lake
Elmo
Polson
Ronan
Hot Springs
Plains
Paradise
St Regis
Superior
Iron Mountain
National Bison Range
Ravalli
St Ignatius
Lindbergh Lake
Seeley Lake
Arlee
Evaro
Alberton
Frenchtown
Ovando
Missoula
Lolo
Lolo Hot Springs
Lolo Pass
Florence
Clinton
Drummond
Stevensville
Hamilton
Darby
Philipsburg
Deer Lodge
Garrison
Helena
Lake Helena
Canyon Ferry Lake
Canyon Ferry
Townsend
Toston
Wilsall
Rimini
Boulder
Basin
Jefferson
Whitehall
Three Forks

Table 3--Mountain pine beetle infestations in the Northern Region during 1977

Area	History	Acres Infested	Trees Killed	Prediction
		Lodgepole Pine		
Bozeman-Gallatin RD, Gallatin NF, MT	Since 1969, over 350 MMBF have been killed.	146.0 M	4.4 MM	Over 4 MM trees could be killed in 1978.
Hebgen Lake RD, Gallatin NF, MT	Increased since 1970.	78.0 M	1.7 MM	From 1.5 to 8.3 MM trees may be killed in 1978 on 183.2 M acres.
Yellowstone National Park, WY	Started about 1967 in S.W. half of Park.	129.3 M	2.8 MM	Tree killing will increase along the N.W. border near W. Yellowstone.
W. side of Glacier National Park, MT	Epidemic level since 1970.	142.8 M	12 MM	About 29.7 MM trees could be killed in 1978.
W. side of Flathead R. on Glacier View RD, Flathead NF, MT	Started in 1975.	27.6 M	1.5 MM	Over 5 MM trees may be killed in 1978.
Yaak R. Drainage, Kootenai NF, MT	Epidemic level since 1972. Nearly 397 M trees have been killed.	11.7 M	120.5 M	More than 84 M trees will probably be killed in 1978.
Jack Cr. and W. Fk. Madison R., Beaverhead NF, MT	Increasing since mid-1970's.	15.8 M	29.7 M	Increasing
Thompson R. drainage, Lolo NF, MT	Epidemic level since 1971.	13.7 M	383.8 M	Will continue at about same level.
S.E. of St. Regis, MT, along Clark Fk. R.	Active since 1964. Started to decline by 1971.	About 2.0 M	Hundreds	Decreasing
N. face of Shook Mtn., Bitterroot NF, MT	Started in 1972. About 20.8 M trees have been killed since 1974.	1.1 M	15.5 M	Will continue at about same level.
		Ponderosa Pine		
N. face of Shook Mtn., Bitterroot NF, MT	Started in 1972. About 404.8 M trees have been killed since 1974.	1.1 M	92.8 M	Will continue

Area	History	Acres Infested	Trees Killed	Prediction
Lewis and Clark NF, mainly N. and S. of Lewistown, MT	Chronic in area since 1947. Increasing since late 1960's.	55.4 M	About 252.1 M	Will continue at same level.
Judith and Belt Cr. RD's, Lewis and Clark NF, MT	Active on Districts since 1960's.	1.6 M	10.6 M	Static
Little Rocky Mtns., MT	Started in 1973,	2.7 M	2.5 M	Will continue.
Little Rocky Boy Indian Reservation, MT	Started about 1976.	0.3 M	2.2 M	Static
Crow Indian Reservation, MT	Started in 1971 and reached epidemic level in 1973.	3.5 M	94.7 M	Might increase
S.W. of Helena, MT	Started in mid-1970's	0.7 M	1.4 M	Static
Bitterroot Valley, MT	Started about 1975.	1.0 M	Over 1.0 M	Might increase
Blackfoot Valley, MT	Started about 1973.	Several thousand	Over 1.0 M	Static
Clark Fk. Valley, MT	Started about 1970.	Several thousand	About 4.0 M	Static
Fisher R.-Pleasant Valley complex, Kootenai NF, MT	Started about 1975.	About 1.0 M	About 1.0 M	Might increase
	Western White Pine			
Flathead NF, MT, N. of Columbia Falls and around Hungry Horse Reservoir	Chronic since early 1960's.	Small group kills	Several hundred	Static
N. Idaho	Chronic in all remaining mature stands.	Small group kills	Several thousand	Static
	Limber Pine			
Elkhorn Mtns., W. of Radersburg, MT	Active for about 5 years.	About 1.0 M	Several thousand	Decreasing

Douglas-Fir Beetle, Dendroctonus pseudotsugae (Hopk.).

Many more groups of dying trees, due to the Douglas-fir beetle, were observed this year than in 1976 in the northern Idaho Forests. A few hundred trees were killed about 20 miles east of Coeur d'Alene, Idaho, and 600 to 700 trees were killed north of Wallace, Idaho, along Eagle and Prichard Creeks. On the Nezperce National Forest, Idaho, hundreds of trees were killed south of the Middle Fork Clearwater River and thousands south of the Selway River from Lowell to Meadow Creek. Northwest of Priest River, Idaho, hundreds of dying trees were detected. A few hundred dead trees were observed on the Helena National Forest, Montana. Douglas-fir beetle infestations are predicted to expand and kill more trees in 1978.

Pine Engraver Beetles, Ips sp.

The dry spring and summer of 1977 favored increases of pine engraver populations in ponderosa pine stands. By mid-June, the first generation had emerged from trees attacked earlier in the year. Seldom do pine engravers kill trees this early in R-1.

Thousands of ponderosa pines were killed throughout the Flathead Indian Reservation and along the Clark Fork and Lolo Creek drainages in Montana. Large pine engraver infestations are expected to continue in 1978 if drought conditions persist in the ponderosa pine type.

Western Balsam Bark Beetle, Dryocoetes confusus (Swaine)

This beetle is a chronic problem in subalpine fir stands in Montana. It, together with a species of Scolytus, killed over 10,000 trees in the Middle, South, and North Forks on the Flathead River system. Thousands of fir were killed on the Beaverhead National Forest and in Yellowstone National Park, Wyoming. Several thousand trees were killed near White Sulphur Springs and Lincoln, Montana.

Fir Engraver Beetle, Scolytus ventralis (LeConte)

Fir engraver damage was not too significant in 1977. Several hundred killed trees were detected in the Swan River and Swift Creek drainages of the Flathead National Forest.

Populations of this beetle usually build up during drought years; thus it could be an increased problem in 1978.

Western Pine Beetle, Dendroctonus brevicomis (LeConte)

Extensive damage by this beetle is not common in R-1. Outbreaks seem to be associated with drought. Often, larger ponderosa pines are top-killed by Ips and their bases infested by D. brevicomis. This happened along Lolo Creek in Montana in 1977 and throughout northern Idaho.

Hundreds of mature trees were killed in Pleasant Valley on the Kootenai National Forest, and some were detected on the west side of the Flathead Indian Reservation. Infested trees were also found along the Clearwater River, Nezperce NF, and on the Nezperce Indian Reservation in Idaho.

Other Insects

Larch Looper, Semiothisa sexmaculata (Pack.)

No defoliation was evident in 1977 in 2 M acres of western larch infested by the looper in 1976 near Thompson Falls, Montana.

Gouty Pitch Midge, Cecidomyia piniinopis Osten Sacken.

Damage by this midge is not often conspicuous in the Northern Region. In 1977, scattered ponderosa pine saplings were heavily infested along the Lochsa River drainage in Idaho.

The Mountain Pine Cone Beetle, Conophthorus monticolae (Hopk.)

Cone beetles destroyed approximately 85 percent of the second-year western white pine cones in a Sandpoint, Idaho, seed orchard on the Idaho Panhandle National Forests, Idaho. An average of 60 percent of the cone crop was lost and in some spots, 90 percent cone loss occurred. No insecticide is available for controlling this insect.

Pine Needle Scale, Chionaspis pinifoliae (Fitch)

One of the heaviest infestations ever seen in the Northern Region occurred along about 5 miles of the dusty Jocko River Road, Flathead Indian Reservation, Montana, in ponderosa pine stands.

Western Pine Shoot Borer, Eucosma sonomana Kft.

Shoot damage was observed in a 9-year-old ponderosa pine plantation on the Lochsa Ranger District. This is the first time it has been formally reported on the Clearwater National Forest, Idaho.

Smaller European Elm Bark Beetle, Scolytus multistriatus (Marsham)

Adults were collected from pheromone baited traps. New county records were reported for Richland, Sargent, and Benson Counties in North Dakota. Its presence was detected also in several eastern Montana communities.

Native Elm Bark Beetle, Hylurgopinus rufipes (Eichhoff)

Adults were collected from several attractant traps. New county records occurred in Grank Forks and Benson Counties in North Dakota.

Ash Borer, Podosesia syringae fraxini (Lugger)

Moderate to heavy infestations of ash borers in shelterbelts were evident in southwest North Dakota.

STATUS OF DISEASES

Cankers and Stem Rusts

There was no apparent change in stem rust infection of pines, but several new areas of lodgepole pine with heavy Cronartium comandrae Pk. infection were found.

More dead trees, tops, branches of seedling and sapling Douglas-fir and true firs occurred this year than in previous years. Damage resulted from stem infections of an unidentified canker-causing fungus, probably Tympanis sp. or Scleroderris sp.

Nursery Diseases

Root fungi did not cause significant damage to bareroot nursery seedlings; but container seedling losses were as great as 5 to 10 percent. Fusarium spp. were the major fungi involved.

Topkilling of 2-0 bareroot western larch at the Coeur d'Alene nursery was common last spring. Similar damage occurred on container-grown seedlings at several greenhouses. Damage was caused by Botrytis cinerea Pers. ex Fr.

Stem Decays

Stem decays were associated with hazard trees in Glacier National Park campgrounds.

In Yellowstone National Park, nearly 2,000 high risk hazard trees in developed recreation sites were removed. Most were removed because of butt and root decay caused by Fomes pini ([Brot.] Fr.) Karst. and either Coniophora puteana (Schum. ex Fr.) Karst. or Polyporus schweinitzii Fr.

Urban and Community Forestry

Dutch elm disease (caused by Ceratocystis ulmi [Buism.] C. Mor.) occurs in scattered locations in North Dakota and in two counties (Missoula and Ravalli) in western Montana. Surveys of several eastern Montana communities detected the presence of the smaller European elm bark beetle, Scolytus multistriatus [Marsham], the principal vector of the disease. Six American elms with Dutch elm disease were cut on the University of Montana campus. The University is pursuing a vigorous sanitation program and in 2 years has lost 10 trees (8.5 percent of the elm population). All these trees were in two rows and probably root-grafted. Losses are expected to continue on the campus. Spread of the disease into areas where the beetle occurs in also expected.

Dwarf Mistletoe

The dwarf mistletoes (Arceuthobium spp.) are still one of the major groups of damaging organisms in the Region. Control is accomplished in conjuntion with normal timber management activities and is financed from timber funds.

Complete examination of about 1,500 acres of lodgepole pine on two areas near West Yellowstone, Montana, showed large areas of all-aged stands to be dwarf mistletoe-free. The land manager has the option of maintaining this all-aged condition in these areas without considering dwarf mistletoe impact.

The lodgepole pine dwarf mistletoe, A. americanum Nutt. ex Engelm., was found infecting two whitebark pine near West Yellowstone, Montana. This cross-over infection is considered a rare occurrence.

Root Diseases

Two existing root disease problems and one potential problem occurred in the Region.

Poria weirii (Murr.) Murr., usually found in combination with one to six other decay fungi, causes root disease centers as large as 5 acres in grand fir and Douglas-fir in northern Idaho and western Montana. A survey of the Coeur d'Alene part of the Idaho Panhandle National Forests showed that these centers covered 5 to 7 percent of the commercial forest area. Occurrence of root disease centers is significantly correlated with soil type, hatitat types, productivity, elevation, and aspect. Dynamics of root disease centers (spread rates, regeneration, survival, etc.) is not well understood, and accurate impact cannot be determined. However, using information from the above survey, annual margin-spread rates of about 1.5 feet found in the Pacific Northwest Region, and an assumption that regeneration will not reach merchantable size, an estimate of annual growth impact is 400 to 500 MMBF in northern Idaho. Additional loss due to P. weirii occurs in the grand fir type in western Montana.

The other root disease problem is caused by Armillaria mellea (Vahl ex Fr.) Kumm. Isolated root disease centers as large as 20 acres are present in western Montana. In central Montana, centers as large as 300 acres are associated with limestone soils. Root disease centers occupy about 10 percent of the forested acreage on these soils. Five to 10 percent of five conifer species in a campground on the Lewis and Clark National Forest were infected.

Fomes annosus (Fr.) Cke. is a potential problem in the Region. In western Montana, the fungus is associated with bark beetle-killed mature ponderosa pine. The fungus is also present in roots of Douglas-fir seed trees. Although direct tree killing has not occurred, trees with 60 to 70 percent of the roots decayed have been windthrown.

Spores are sometimes numerous enough in western Montana to colonize 70 to 90 percent of exposed pine discs.

Polyporus schweinitzii is present in many old-growth stands of Douglas-fir and western white pine. Losses are confined to isolated blowdown of old trees. This fungus may not be a problem in managed young stands.

Needle Diseases

This year a larger number of needle and leaf diseases were present over a wider geographical range than in preceding years. Lophodermella concolor (Dearn.) Darker and Scirrhia pini Funk and A.K. Parker were common on two- and three-needle pines. Infection was greatest in northern Idaho but extended into western and central Montana. Lecanosticta sp. caused significant defoliation of western white pine over much of its range. Lophodermella arcuata (Darker) Darker was present on whitebark and limber pines on the Lewis and Clark National Forest in central Montana.

Hypodermella laricis Tub. and Meria laricis Vuill., in conjunction with larch casebearer and larch sawfly feeding, caused needle discoloration of western larch on 45,000 acres.

A fungus, tentatively identified as Delphinella balsameae (Waterm.) Mueller, caused tip dieback on true firs in northern Idaho. This was the first occurrence of D. balsameae in Idaho.

Pucciniastrum spp. were widespread on true firs. Melampsora occidentalis Jacks infected Douglas-fir in northwestern Montana.

Heavy infections of Melampsora medusae Thuem. caused early leaf fall in quaking aspen stands in many areas of western Montana and northern Idaho.

Air Pollutants

The aluminum smelter at Columbia Falls, Montana, emitted more than 4,000 pounds of fluoride per day. As much as 60 percent of some mixed conifer stands 5 miles downwind of the aluminum plant have been killed, and growth loss on living trees exceeds 35 percent. Lodgepole pine, western white pine, Douglas-fir, western redcedar, western hemlock, western larch, and ponderosa pine have been damaged on 20 M to 30 M acres of State, Federal, and private lands. Herbivores dependent on native vegetation are still being poisoned by fluorides. A foam scrubbing system installed by the company failed, and they are now installing a new system to reduce fluoride emissions.

Sulphur oxides, mercaptans, and hydrogen sulfides emitted from a pulp mill caused injury to Douglas-fir and ponderosa pine near Missoula, Montana. The mill is expanding now and emissions may be increased in the near future.

Sulphur dioxide and heavy metals (lead, zinc, cadmium) emitted from a copper smelter at Anaconda, Montana, have damaged more than 300 M acres of nearby ecosystems. Highly acid soils (pH 3-3.5) are a result of these emissions and much of the area is barren of plant life and is eroding in massive quantities.

Sulphur oxides and fluorides emitted from two coal-fired electric power generating plants in eastern Montana have caused an increase in ponderosa pine needle death and other abnormal conditions nearby. Two new power generating plants will be built in the same area, and damage to plant life is expected to increase.

Weather Damage

Despite the dry conditions this year, no reports of drought-caused conifer injury or death were received, and no drought-caused damage was found in this year's aerial surveys or ground checking.

DETECTION SURVEYS

Detection is a key element in the management of forest pests. Forest Insect and Disease Management depends on the assistance of field personnel of all agencies to alert them to the activity of pests. One detection system is sending in Forest Insect and Disease Damage Detection Reports (form 5200-1) (figure 4) and specimens of the causal agent or damage to:

USDA Forest Service
Forest Insect and Disease Management
Federal Building
Missoula, MT 59801

Form 5200-1 was revised in March 1978 and consists of a booklet of report sheets which are carbon treated. Directions for shipment of samples and filling out form data are included. The reporter sends in white and blue copies and keeps pink copy in booklet for this record. (See figure 4.)

During 1977, over 57 detection reports were received and answered by Forest Insect and Disease Management.

Aerial surveys to detect forest insect, disease, animal, and weather damage were made on 36.24 MM acres of forested land in the Northern Region during 1977. Special surveys were flown in June to detect larch casebearer defoliation and early hardwood defoliations in North Dakota. Another special suvey was made in North Dakota in September for late hardwood defoliators. The main survey season extends from mid-July to the last of August.

The states of Idaho and Montana cooperate in making these annual surveys. Acres flown by ownership are tabulated below:

State	Ownership	Acres surveyed (millions)
Montana	National Forest	12.8
	Bureau of Land Management	.8
	Glacier National Park	.6
	Indian	1.0
	State and private	4.8
	Subtotal	20.0
Northern Idaho	National Forest	10.7
	Bureau of Land Management	.2
	Indian	.1
	State and private	3.3
	Subtotal	14.3
North Dakota	Federal	0
	Indian	.04
	State and private	.1
	Subtotal	.14
Wyoming	Yellowstone National Park	1.8
	Total	36.24

☆GPO 1978 798-868

Form Approved
OMB NO. 040-R-2844

U.S. DEPARTMENT OF AGRICULTURE
Forest Service

DETECTION REPORT
FOREST INSECT AND DISEASE DAMAGE

PART A - INSTRUCTIONS: *This report is authorized by the Forest Pest Control Act of 1947. Voluntary responses to the report greatly assist the Forest Service in the detection and prevention of potentially destructive insects and diseases. PRINT. Shaded areas to be completed by FS. Further instructions above.*

1. TYPE OF LANDOWNERSHIP (X Appropriate Box) ☐☐ - ☐☐
☐ Federal _____ National Forest and District ☐ State _____ State Forest and District ☐ Private

2. LOCATION OF PROPERTY (Give drainage name, prominent landmark, mileage from known location, etc.)

3. IDENTIFICATION OF PROPERTY (To be completed by FS)
Township ☐☐☐☐ Range ☐☐☐☐ Section ☐☐☐☐ 1/4 Section ☐☐☐☐

4. NAME AND BUSINESS ADDRESS (Include Zip Code)

STATE ☐☐ _____
COUNTY ☐☐ _____

5. PHONE NUMBER (Include Area Code)

6. DATE

7. ACTION REQUESTED (X Appropriate Box)
☐ None ☐ Identification ☐ Field Evaluation

8. SAMPLE OF DISEASE (X Appropriate Box) Further Instructions on back.
☐ YES ☐ NO

9. MAP OF AREA ENCLOSED (X Appropriate Box)
☐ Yes ☐ No

10. NUMBER OF ACRES DAMAGED

11. NUMBER OF TREES DAMAGED

12. DISTRIBUTION OF DAMAGE WITHIN THE STAND (X Appropriate Box)
☐ Scattered ☐ Grouped

13. SPECIES AFFECTED (Do not mark in boxes)
☐☐ _____ ☐☐ _____ ☐☐ _____

14. TREE SIZE (X Appropriate Box)
☐ - 20 Seedling
☐ - 21 Sapling
☐ - 22 Pole
☐ - 23 Sawtimber
☐ - 24 Overmature

15. PART(s) OF TREES DAMAGED (X Appropriate Box)
☐ - 30 Root
☐ - 31 Bole
☐ - 32 Branch
☐ - 33 Twig
☐ - 34 Leader
☐ - 35 New Foliage
☐ - 36 Old Foliage
☐ - 37 Bud
☐ - 38 Cone/Seed
☐ - 39 Wood

16. STAND TYPE (X Appro. Box)
☐ - 40 Nursery
☐ - 41 Plantation
☐ - 42 Natural
☐ - 43 Shelterbelt
☐ - 44 Ornamental
☐ - 45 Seed Orchards

17. CASUAL AGENTS OR ASSOCIATED DISTURBANCE (X Appropriate Box)

Insects	Disease	Mechanical		Other
☐ - 50 Bark Beetle	☐ - 60 Root	☐ - 70 Blowdown	☐ - 75 Hail	☐ - 80 Herbicide
☐ - 51 Defoliator	☐ - 61 Foliage	☐ - 71 Thinning	☐ - 76 Snow	☐ - 81 Air Pollution
☐ - 52 Sapsucking	☐ - 62 Decoys	☐ - 72 Logging	☐ - 77 Frost	☐ - 82 Salt
☐ - 53 Borer	☐ - 63 Canker	☐ - 73 Drought	☐ - 78 Wind	☐ - 83 Animal
☐ - 54 Other	☐ - 64 Other	☐ - 74 Flood	☐ - 79 Fire	☐ - 84 Bird

If "other" & known identify: _____ If "other" & known identify: _____

18. DAMAGE SYMPTOMS (Enter any pertinent information to indicate severity of damage or symptoms to help identify casual agent. Use TABLE I on instruction sheet above as an aid in describing symptoms.)

PART B -- TO BE COMPLETED BY FOREST SERVICE ONLY

1. IDENTIFICATION OF DISEASE (Reply by Entomologist/Pathologist)
☐☐ _____ ☐☐ _____ ☐☐ _____

2. INFORMATION REPORTED (X Appropriate Box)
☐ Reared/Cultured ☐ Sample Damage - Resubmit ☐ Sent out for Identification

3. REPORTED BY (Signature)

4. DATE

5. REPORT NUMBER

Previous editions of this form are obsolete.

5200-1(3/78)
253-174

Figure 4.--Detection report form.

ACKNOWLEDGEMENTS

This report was compiled by information provided by the Staff of Forest Insect and Disease Management and State entomologists in Montana, Idaho, and North Dakota. National Forest personnel, Indian agencies, and other Federal, State, and private land managers alerted us to many pest problems.